## DEPARTMENT OF ARTIFICIAL INTELLEGENCE AND DATA SCIENCE

1. Explain divide and conquer technique. Write a recursive algorithm for finding the maximum and minimum elements from a list.

2. Discuss how quicksort works to sort an array, trace quicksort algorithm for the following dataset 65, 70, 75, 80, 85,60, 55, 50, 45. Also derive the worst case complexity of quicksort.

3. Consider the following set of 14 elements in an array -15, -6, 0, 7, 9, 23, 54, 82, 101, 112, 125, 131, 142, 151 When binary search is applied on these elements, find the element which requires maximum number of comparisons. Also determine the average number of key comparisons for successful and unsuccessful search.

4. Explain the binary search algorithm in detail with example. Show that the worst case efficiency of binary search is $\Theta(\log^n)$.

5. Give general divide and conquer recurrence relation with necessary explanation solve the recurrence relation

   $T(n)=2T(n/2) +1$

   $T(n) =T(n/2) +n$

6. Write a merge sort algorithm and discuss its efficiency, sort the list "EXAMPLE" in alphabetical order using the merge sort.

7. List out the advantages and disadvantages of divide and conquer method and illustrate the topological sorting for the following graphs (Source Removal and DFS Method).
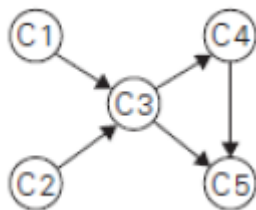
8. Explain the Divide and Conquer Technique. Give the general algorithm DAndC (p) [where p is the problem to be solved]

9. Define decrease and conquer technique. What are the three major variations of decrease and conquer technique? Explain with an example for each.

10. Design an algorithm to sort the n number of elements using insertion sort. Illustrate the tracing of insertion sort algorithm for the following set of numbers

    25,10,72,18,40,11,64,58,32,9

11. What is the differences between DFS and BFS algorithm?

12. Design algorithms to traverse the following graph using DFS and BFS methods also analyses the time complexity of the same.